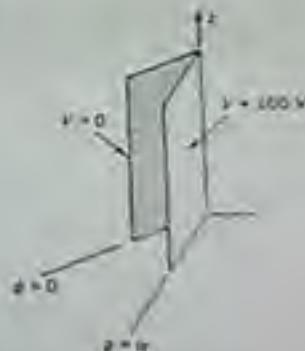


Answer the following questions: (Assuming any missing data)

- 1) An infinite line charge of charge density $p_l = 2nC/m$ lies along the x axis in free space, while two point charges of $8nC$ are located at $(0, 0, 1)$ and $(0, 0, -1)$. Find E at $(2, 3, -4)$. To what value should p_l be changed to cause E to be zero at $(0, 0, 3)$?
- 2) Within the cylindrical region $\rho \leq 5$ m, the electric flux density is given as $4\rho^2 a_\rho$ C/m².
 - What is the volume charge density at $\rho = 2$ m?
 - How much electric flux leaves the cylinder $\rho = 2$, $-5 \leq z \leq 5$?
 - How much charge is contained within this cylinder?
- 3) In cylindrical coordinates two $\varphi = \text{constant}$ planes are insulated along the z axis, as shown in Fig.1. Find the expression for the capacitance and E between the planes, assuming a potential of 100 V for $\varphi = \alpha$ and a zero reference at $\varphi = 0$.

Fig.1



- 4) (a) Find \mathbf{H} in Cartesian components at $\mathbf{r}(2, 3, 4)$ if there is a current filament on the z axis carrying 8 mA in the a_z direction.
 (b) Repeat if the filament is located at $x = -1, y = 2$.
 (c) Find \mathbf{H} if both filaments are present.
- 5) A 100 MHz uniform plane wave is propagating in a medium of $\epsilon_r = 2.56$. If the amplitude of the electric field intensity is 8 mV/m. Find the following parameters.
 - The phase velocity.
 - The wavelength.
 - The phase shift constant.
 - The intrinsic Impedance.
 - The amplitude of the magnetic field intensity.